Academic Year: 2020/2021

Lecturers : Roberto Mancinelli and Laura Ercoli

Course objectives

The course of General and Applied Agroecology aims to provide students the ability to:
- integrate theoretical and practical knowledge of agricultural systems;
- analyze the different agroecosystems management methods with a critical understanding of potential flaws and values;
- acquire knowledge and tools for the analysis of agroecosystems through a systemic approach.

The acquired knowledge in the course aim to provide skills in design and management of sustainable agricultural systems studied in its systematic unit.

Topics

General part (3 ECTS)

Lectures in class: 24 hours.

Agroecology definition, principles and practice.
Systemic approach applied to the agriculture: concept of agroecosystem; agroecosystem properties (productivity, stability, sustainability).
The farm as agroecosystem.
Designing and managing agroecological systems.
Importance of the agroecosystem biodiversity and mixed farming.
Importance of structural complexity between and within the fields: hedges and polyculture.
Environmental impact of agriculture: pollution and loss of biodiversity.
Presentation of concrete examples of crops agroecologically managed.
Field exercise: some concrete situations on field will be observed concerning some agronomic applications addressed to the sustainable management of agroecosystems.

Applied part (3 ECTS)

Lectures in class and/or via video-conference: 24 hours.

The course provide students with a comprehensive view of soil-plant interactions at the field scale in order to optimize the management of the cropping system and its impacts on soil and crop. It addresses the interactions between plants, soil and soil organisms, the roles played by soil organisms in decomposition of organic material and nutrient cycling. Other topics include the importance of soil organisms for soil fertility, mycorrhizas and their effects on crop productivity. The course will also provide detailed information on plant nutrition and fertilizer management of the essential plant macro and micronutrients.

Syllabus:

Soil physical, chemical and biological characters. Soil-plant interactions: functioning of cultivated soils, determinants of soil fertility, dynamics of soil exploration by root systems, rhizospheric processes. Biogeochemical cycles and processes: role of soil organisms (macro-, meso- and micro-fauna and microflora) on the nutrient cycles, and on soil fertility, soil degradation, modifications of biological properties. Fertiliser science: estimation of crop demand, use of mineral and organic fertilisers, recent technological advances.

Suggested texts, References and Notes

- Slides showed during the lessons.
- .....

Prerequisites
The course is recommended to students having good level of knowledge in General ecology and Agricultural ecology, Agronomy, Crops production as well as general knowledge of Biology, Botany, Plant physiology, Soil chemistry, in order to follow and better understand the discussed issues and relations between the various topics in the course.

Teaching Methods
The course is structured in classroom lessons and/or in remote lessons (via video-conference), and in field lesson.
The classroom and remote lessons include all topics of the course program.
The lesson in the field concerns the application of some specific and theoretically discussed aspects.

Assessment
Oral exam and/or written test

Evaluation methods
At the end of the course, the students have the assessment test with an oral exam. The evaluation and the final grade will take into account the acquired knowledge and concepts, the ability to analyze problems, connect interdisciplinary knowledge, formulate hypotheses and judgments, mastery and clarity of expression and exposure. Several questions will be asked to the candidates ranging over the whole program, each of which will be evaluated with a score from 0 to 30. The final grade corresponds to the average of the individual grades.
In critical situations, such as a high number of candidates in the booking, or peculiarities of one or more candidates, the exam can be done in written form with six open-ended questions, evaluated as for the oral exam. Candidates will be given one and a half hours to answer. Furthermore, upon explicit request by individual students, it is possible to take the exam in written or oral form, regardless of what is reported in the official appeal.
At the request of the candidate, a PowerPoint presentation can be discussed concerning the deepening of a topic chosen by the student and agreed with the teacher, followed by some questions about the program. A score from 0 to 30 will be assigned to the presentation and to each of the answers to the questions. The final grade corresponds to the average of the individual grades defined as for the oral exam.